

Patent
52478-2800

CLAIMS

1. (Currently Amended) A fluorescent lamp comprising:

a fluorescent tube that is composed of a glass tube having a phosphor layer formed on an inner surface thereof and mercury and a rare gas enclosed therein; and electrodes that cause an electrical discharge within the fluorescent tube, wherein the glass tube is made of a glass material that contains an emissive element mixed within the glass material, the emissive element emitting, when exposed to first ultraviolet light that is emitted due to mercury excitation, second ultraviolet light that has a longer wavelength than the first ultraviolet light.

2. (Original) The fluorescent lamp of Claim 1,

wherein the emissive element emits visible light together with the second ultraviolet light, when exposed to the first ultraviolet light.

3. (Currently Amended) The fluorescent lamp of Claim 1,

wherein an entire luminous flux emitted from ~~the~~the fluorescent lamp includes:

a first luminous flux that is formed by visible light emitted from the phosphor layer when exposed to the first ultraviolet light;

a second luminous flux that is formed by visible light emitted from the emissive element when exposed to the first ultraviolet light; and

a third luminous flux that is formed by visible light emitted from the phosphor layer when exposed to the second ultraviolet light,

wherein the second luminous flux and the third luminous flux together constitute at least 2% of the entire luminous flux emitted from the fluorescent lamp.

Patent
52478-2800

1 4. (Original) The fluorescent lamp of Claim 1,
2 wherein a thickness of the glass tube is 0.62mm or less.

1 5. (Original) The fluorescent lamp of Claim 1,
2 wherein a thickness of the phosphor layer is below 20 μm .

1 6. (Currently Amended) A fluorescent lamp comprising:
2 a fluorescent tube that is composed of a glass tube having a phosphor layer
3 formed on an inner surface thereof and mercury and a rare gas enclosed therein; and
4 electrodes that cause an electrical discharge within the fluorescent tube,
5 wherein the glass tube is made of a glass material containing an oxide mixed
6 within the glass material, of the oxide including at least one element selected from the group
7 consisting of titanium, zirconium, vanadium, niobium, tantalum, molybdenum, tungsten,
8 thallium, stannum, plumbum, bismuth, lanthanum, cerium, praseodymium, neodymium,
9 samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium,
10 and lutetium.

1 7. (Original) The fluorescent lamp of Claim 6, wherein
2 the glass material contains 0.01wt% to 10wt% of an oxide of at least one element
3 selected from the group consisting of titanium, zirconium, vanadium, niobium, tantalum,
4 molybdenum, tungsten, lanthanum, cerium, praseodymium, neodymium, samarium, europium,
5 gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium.

Patent
52478-2800

1 8. (Original) The fluorescent lamp of Claim 6, wherein
2 the glass material contains 0.01wt% to 0.5wt% of an oxide of at least one element
3 selected from the group consisting of thallium, stannum, plumbum, and bismuth.

1 9-10. (Cancelled)

1 11. (Previously presented) The fluorescent lamp of Claim 12,
2 wherein an entire luminous flux emitted from the fluorescent lamp includes:
3 a first luminous flux that is formed by visible light emitted from the phosphor
4 layer when exposed to the first ultraviolet light;
5 a second luminous flux that is formed by visible light emitted from the emissive
6 element when exposed to the first ultraviolet light; and
7 a third luminous flux that is formed by visible light emitted from the phosphor
8 layer when exposed to the second ultraviolet light,
9 wherein the second luminous flux and the third luminous flux together constitute
10 at least 2% of the entire luminous flux emitted from the fluorescent lamp.

1 12. (Currently Amended) A fluorescent lamp comprising:
2 a fluorescent tube having a protective layer formed on an inner surface thereof, a
3 phosphor layer formed on the protective layer, and mercury and a rare gas enclosed therein; and
4 electrodes that cause an electrical discharge within the fluorescent tube,
5 wherein the protective layer contains an oxide of at least one emissive element
6 selected from the group consisting of ~~titanium~~, zirconium, vanadium, niobium, tantalum,

Patent
52478-2800

7 molybdenum, tungsten, thallium, stannum, plumbum, bismuth, praseodymium, neodymium,
8 samarium, gadolinium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium.

1 13. (Currently Amended) The fluorescent lamp of Claim 12, wherein
2 the protective layer contains 0.01wt% to 10wt% of an oxide of at least one
3 element selected from the group consisting of ~~titanium~~, zirconium, vanadium, niobium, tantalum,
4 molybdenum, tungsten, praseodymium, neodymium, samarium, gadolinium, dysprosium,
5 holmium, erbium, thulium, ytterbium, and lutetium.

1 14. (Cancelled)

1 15. (Currently Amended) A high intensity discharge lamp comprising:
2 an arc tube in which an emissive material is enclosed, the emissive material
3 emitting visible light and ultraviolet light when excited by an electric discharge; and
4 an envelop whose one surface surrounding the arc tube is covered with a
5 phosphor layer,
6 wherein the envelop is made of a glass material that contains an emissive element
7 protective layer, the emissive ~~element~~ protective layer emitting, when exposed to first ultraviolet
8 light that is emitted due to excitation of the emissive material by the electric discharge, second
9 ultraviolet light that has a longer wavelength than the first ultraviolet light.

1 16. (Currently Amended) The high intensity discharge lamp of Claim 15,
2 wherein the emissive ~~element~~ protective layer emits visible light together with the
3 second ultraviolet light when exposed to the first ultraviolet light.

Patent
52478-2800

1 17. (Currently Amended) The high intensity discharge lamp of Claim 15,
2 wherein an entire luminous flux emitted from the high intensity discharge lamp
3 includes:
4 a first luminous flux that is formed by the visible light emitted due to the
5 excitation of the emissive material by the electric discharge;
6 a second luminous flux that is formed by visible light emitted from the emissive
7 ~~element~~ protective layer when exposed to the first ultraviolet light; and
8 a third luminous flux that is formed by visible light emitted from the phosphor
9 layer when exposed to the second ultraviolet light.

1 18. (Currently Amended) A high intensity discharge lamp comprising:
2 an arc tube in which an emissive material is enclosed, the emissive material
3 emitting visible light and ultraviolet light when excited by an electric discharge; and
4 an envelop whose one surface surrounding the arc tube is covered with a
5 phosphor layer,
6 wherein the envelop is made of a glass material that contains an oxide mixed
7 within the glass material, of the oxide including at least one element selected from the group
8 consisting of titanium, zirconium, vanadium, niobium, tantalum, molybdenum, tungsten,
9 thallium, stannum, plumbum, bismuth, lanthanum, cerium, praseodymium, neodymium,
10 samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium,
11 and lutetium.

Patent
52478-2800

1 19. (Currently Amended) A high intensity discharge lamp comprising:
2 an arc tube in which an emissive material is enclosed, the emissive material
3 emitting visible light and ultraviolet light when excited by an electric discharge; and
4 an envelop that is provided so as to envelop the arc tube,
5 wherein the envelop is made of a glass material that contains an emissive ~~element~~
6 protective layer, the ~~emissive element~~ protective layer emitting visible light, when exposed to
7 ultraviolet light that is emitted due to excitation of the emissive material by the electric
8 discharge.

1 20. (Currently Amended) The high intensity discharge lamp of Claim 19,
2 wherein an entire luminous flux emitted from the high intensity discharge lamp
3 includes:
4 a first luminous flux that is formed by the visible light emitted due to the
5 excitation of the emissive material by the electric discharge; and
6 a second luminous flux that is formed by visible light emitted from the emissive
7 ~~element~~ protective layer when exposed to the ultraviolet light that is emitted due to the excitation
8 of the emissive material by the electric discharge.

1 21. (Currently Amended) A high intensity discharge lamp comprising:
2 an arc tube in which an emissive material is enclosed, the emissive material
3 emitting visible light and ultraviolet light when excited by an electric discharge; and
4 an envelop that is provided so as to envelop the arc tube,
5 wherein the envelop is made of a glass material that contains an oxide mixed
6 within the glass material, ~~of the oxide including~~ at least one element selected from the group

Patent
52478-2800

7 consisting of titanium, zirconium, vanadium, niobium, tantalum, molybdenum, tungsten,
8 thallium, stannum, plumbum, bismuth, lanthanum, cerium, praseodymium, neodymium,
9 samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium,
10 and lutetium.

1 22. (Cancelled)

1 23. (Previously presented) A fluorescent lamp comprising:

2 a fluorescent tube having a protective layer formed on an inner surface thereof, a
3 phosphor layer formed on the protective layer, and mercury and a rare gas enclosed therein; and
4 electrodes that cause an electrical discharge within the fluorescent tube,

5 wherein the protective layer contains an oxide of at least one element selected
6 from the group consisting of titanium, zirconium, vanadium, niobium, tantalum, molybdenum,
7 tungsten, thallium, stannum, plumbum, bismuth, praseodymium, neodymium, samarium,
8 gadolinium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium,

9 wherein the protective layer contains 0.01wt% to 0.5wt% of an oxide of at least
10 one element selected from the group consisting thallium, stannum, plumbum, and bismuth.

1 24. (Previously presented) The fluorescent lamp of Claim 12,

2 wherein an entire luminous flux emitted from the fluorescent lamp includes:

3 a first luminous flux that is formed by visible light emitted from the phosphor
4 layer when exposed to ultraviolet light that is emitted due to mercury excitation;

5 a second luminous flux that is formed by visible light emitted from an emissive
6 element contained in the protective layer when exposed to ultraviolet light that is emitted due to
7 mercury excitation; and

Patent
52478-2800

8 a third luminous flux that is formed by visible light emitted from the phosphor
9 layer when exposed to ultraviolet light that is emitted from the emissive element when exposed
10 to ultraviolet light that is emitted due to mercury excitation, and
11 wherein the second luminous flux and the third luminous flux together constitute
12 at least 2% of the entire luminous flux emitted from the fluorescent lamp.

1 25. (Currently Amended) A fluorescent lamp comprising:
2 a fluorescent glass tube;
3 a phosphor layer formed on an inner surface of the glass tube;
4 mercury enclosed within the glass tube;
5 a gas enclosed within the glass tube having a characteristic of enabling a the
6 mercury excitation for emitting a first ultraviolet light when excited by an electrical discharge,
7 the first ultraviolet light exciting the phosphor layer to emit a first visible luminous flux for
8 transmission through the fluorescent glass tube;
9 electrodes within the fluorescent glass tube for causing ~~an~~ the electrical discharge;
10 and
11 an emissive ~~element~~ protective layer embedded within the fluorescent glass tube
12 having a characteristic of emitting a second visible luminous flux within the fluorescent glass
13 tube when activated by the first ultraviolet light, while permitting transmission of at least a
14 portion of the first visible luminous flux and the second visible luminous flux to an exterior of
15 the fluorescent glass tube.

Patent
52478-2800

1 26. (Currently Amended) The fluorescent lamp of Claim 25 wherein the emissive
2 ~~element~~ protective layer further has a characteristic of emitting a second ultraviolet light when
3 activated by the first ultraviolet light, the second ultraviolet light activates the phosphor light to
4 emit a third visible luminous flux to the exterior of the fluorescent glass tube.

1 27. (Currently Amended) The fluorescent lamp of Claim 26 wherein the emissive
2 ~~element~~ protective layer ~~is selected from~~ includes an oxide of at least one element selected from
3 the group consisting of titanium, zirconium, vanadium, niobium, tantalum, molybdenum,
4 tungsten, thallium, stannum, plumbum, bismuth, lanthanum, cerium, praseodymium,
5 neodymium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium,
6 ytterbium, and lutetium.

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.